University of Mumbai			
CLASS: T.E. (Electronics Engineering)		**Semester - VI**	
SUBJECT: Microprocessors & Microcontrollers-II			
Periods per week (each of 60 min.)	Lecture	4	
	Practical	2	
	Tutorial	-	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	Practical examination	3	25
	Oral Examination	-	-
	Term Work	-	25
	Total		150

Objective	The objective of this course is to introduce to the students 16 bit Microprocessors & Microcontrollers	
Pre-requisite	concept of 8 bit Microprocessor and Microcontroller	
Module	**Contents**	**Hours**
1	**8086 and 8088 Microprocessors:** Architecture and organization of 8086/8088 microprocessors family, bus interface unit, 8086/8088 hardware pin signals, timing diagram of 8086 family microprocessors, simplified read/ write bus cycles, 8086 minimum and maximum modes of operation, 8086/8088 memory addressing, address decoding, memory system design of 8086 family, timing considerations for memory interfacing, input/output port addressing and decoding, introduction to 8087 floating point coprocessor and its connection to host 8086.	**15**
2	**8086 assembly language programming:** Addressing modes, 8086 instruction formats and instruction set, data transfer, arithmetic, bit manipulation, string, program execution transfer and program control instructions, machine codes of 8086 instructions, assemble language syntax, assembler directives, initialization instructions, simple sequential and looping programs in assemble language, debugging assembly language programs.	**10**
3	**Programmable Interface and peripheral devices:** Interfacing of 8155, 8255 and 8259 with 8086 and study and interfacing of 8257 DMA controller with 8086. • Comparative study of salient features of	**8**

	8086, 80196, 80296, 80386, 80486 and Pentium.	
4	**PIC Controllers: PIC18** ▪ PIC18 memory organization, ▪ CPU registers, ▪ Pipelining, ▪ Instruction format, ▪ Addressing modes, ▪ Sample of PIC18 Instructions. Overview of the 8-bit MCU Market	**8**
5	**PIC18 Assembly language Programming** ▪ Assembly language programme structure, ▪ Assembler directives, ▪ Writing programmes to perform arithmetic computations, ▪ Programme loops, ▪ Reading and writing data in programme memory, ▪ Logic Instructions, ▪ Using programme loop to create time delays, ▪ Rotate instructions, ▪ Using rotate instructions to perform multiplications &divisions.	**8**
6	**Parallel Ports** ▪ **I**/O Addressing, ▪ Synchronization. ▪ Overview of the PIC18 parallel ports, ▪ Interfacing with simple output devices.	**7**

Recommended Books:

1) Microprocessors and Interfacing, Douglas V Hall, Tata Mc Gram Hill
2) Han Way Huang, PIC Microcontroller, Cengage learning
3) Design with PIC MicrocontrollersBy John B. Peatman, Pearson Education Asia LPE
4) The 8086/8088 Family, John Uffenbuck, Pearson Media,LPE
5) DV Kodavade, S Narvadkar, 8085-86 Microprocessors Architecture Progg and Interfaces, Wiley
6) Ajay Deshmukh, Microcontrollers, TMH
7) Smith, Programming The Pic Microcontroller With Mbasic(CD), Elsevier
8) Gaonkar Ramesh,Fundamentals of microcontrollers and applications in embedded systems, Penram International publishing.
9) Martin Bates, PIC Microcontrollers, 2e, Elsevier.

Practical/ Oral Examination:

Practical Examination will be based on experiments performed from the list of experiment given in the syllabus and the evaluation based on the same experiment.

Oral will be based on any experiment performed from the list of experiment given in the syllabus and the entire syllabus.

Term work:

Term work shall consist of minimum eight experiments and a written test.

The distribution of marks for term work shall be as follows,

Laboratory work (Experiments and Journal) : 10 marks.
Test (at least one) : 10 marks.
Attendance (Practical and Theory) : 05 marks.

The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term-work.

Suggested Practical list

The experiments can be performed by using Proteus Vsm software

8086 (any 4)

1. Write a program to arrange block of data in i) ascending and (ii) descending order.
2. Write a program to find out any power of a number such that $Z = X^N$, where N is programmable and X is unsigned number.
3. Write a programmable delay routine
4. Write a program to find out largest number in a block.
5. Experiment on string instructions.
6. Write a programme to multiply 32 bit number.

PIC18:

The experiments can be performed by using Proteus VSM Platform (any4)

To design and test circuits

1. Addition , Subtraction
2. BCD Adder
3. Multiplication, Division
4. 4 bit LCD driver
5. Working of ADC/ DAC
6. Demonstration of Traffic light
7. Implement door bell
8. Data Logger
9. Working of calculator

On latest: Students can perform

To design and test circuits on Graphical based LCD, Interface external memory, Temperature display, Key pad interface using AVR controller.

Theory Examination:

1. Question paper will be comprise of total 7 questions, each of 20 marks.
2. Only 5 questions need to be solved.
3. Question number 1 will be compulsory and will cover all modules.

4. Remaining questions will be from same module or mixed in nature. (e.g.- suppose Q.2 has part (a) from, module 3 then part (b) will be from any module other than module 3.)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.
6. No question should be asked from pre-requisite module.